

Appl. No. 09/634,522

Response to Office Action of October 3, 2003

REMARKS

The non-final Office Action was issued on pending claims 1-22 and 28-64. Claims 1-22 and 28-64 stand rejected. Claims 23-27 were previously withdrawn from consideration. In this Response, claims 1, 15, 18, 19, 39, 41, 43 and 45 have been amended, claims 23-37 and 46-64 have been cancelled without prejudice and claims 65-68 have been added. Thus, claims 1-22, 38-45 and 65-68 are pending in the application.

Applicant thanks the Examiner for the courteous telephone interview on March 31, 2004. Applicant invites the Examiner to call Applicant's Representative to discuss any issues with this application.

Applicant notes that page 1 of the Office Action (Office Action Summary) does not include claim 28. However, claim 28 was pending in the application.

Withdrawn and Cancelled Claims

Claims 23-27 stood withdrawn prior to this Response. Claims 23-27 have now been cancelled without prejudice to quickly place the application in condition for allowance.

Claims 46-64 have also been cancelled without prejudice. Although Applicant believes claims 46-64 are patentable, those claims have been cancelled to reduce the number of claims that would be considered so that the application can quickly pass to allowance.

The cancellation of claims 23-27 and 46-64 is not being made in response to any rejection or in view of any prior art.

Specification

In Office Action paragraph 1, the abstract of the disclosure was objected to under the assertion that no color drawing was provided as referenced in the specification. Applicant respectfully disagrees.

Figs. 3-6 are color photographs and were submitted together on a single sheet of drawings with the application as originally filed. Applicant will resubmit the color photograph drawings of Figs. 3-6 if requested by the Examiner.

Thus, Applicant submits that the objection has been overcome.

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Claim Rejections – 35 USC § 112

In Office Action paragraph 2, claims 39, 41, 43, 45, 47, 49, 51 and 53 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter applicant regards as the invention. The Office Action refers to the phrase “microsphere particles have a single, nominal diameter.” In Office Action paragraph 3, claims 39, 41, 43, 45, 47, 49, 51 and 53 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter applicant regards as the invention. The Office Action refers to the phrase “microparticles have a single, nominal size.”

As mentioned above, claims 47, 49, 51 and 53 have been cancelled without prejudice to quickly pass the application to issue.

Although Applicant disagrees with the rejections, claims 39, 41, 43 and 45 have been amended to clarify the claims to quickly pass the application to issue. Those claims now recite wherein a substantial amount of the microsphere particles (or microspheres) have about the same diameter. Applicant submits that the §112 rejections should be withdrawn.

Claim Rejections – 35 USC §§ 102, 103

In Office Action paragraph 6, claims 18, 28, 29, 34, 35, 42, 43, 46, 47-49, 59, 61 and 62 were rejected under 35 U.S.C. § 102(b) as being anticipated by Matsko (US 3,849,350). In Office Action paragraph 7, claims 30-33, 36, 39, 50-54, 63 and 64 were rejected under 35 U.S.C. § 102(b) as being anticipated by Young (US 3,652,486). Applicant kindly notes that apparently claim 39 should have been claim 37 in this rejection because Young was applied to independent claims 30 and 31 and their respective dependent claims. In Office Action paragraph 9, claims 1-17, 19-27, 37, 38, 40, 41, 44, 45, 55-58 and 60 were rejected under 35 U.S.C. § 103(a) as being anticipated by Filice et al. (US 4,819,608). Applicant respectfully disagrees.

As mentioned above, claims 23-37 and 46-64 have been cancelled without prejudice to quickly pass the application to allowance.

Independent claims 1, 15, 18 and 19 have been amended to clarify the claims. Claim 1 now recites that the microsphere particles range from about 69% by volume to about 85% by volume of the composite material. Also, claim 1 now calls for the composite material to be

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substantially free of voids in the matrix material between the microsphere particles. Claims 15, 18 and 19 have been similarly amended, although not identically to claim 1.

Applicant respectfully submits that the cited references simply do not disclose or suggest, alone or in combination, Applicant's claimed high concentration of microspheres in which the matrix material is substantially free of void space between the microspheres. The microspheres may be hollow and contain void space. However, the matrix material itself is substantially free of entrained voids or gas, i.e., the matrix material which is outside of the microspheres is substantially free of entrained voids. Applicant's composite material could be made or formed in a shape which has hollow interior portions, cavities or other voids; however, the matrix material itself is substantially free of voids.

One significant difference between Applicant's composite material and numerous syntactic foam prior art references is that syntactic foams contain entrained voids, for example void space, air or gas, in the resin material. Syntactic foams by their very name refer to "foam" which includes entrained gas. Syntactic foams have included resin, microspheres, and entrained air. However, syntactic foams have not included Applicant's claimed high concentration of microspheres in a matrix material which is substantially free of voids.

Applicant's composite material having the high concentration of microspheres and being substantially free of voids within the matrix material (e.g., resin) provides remarkable advantages. For example, the new composite material can provide remarkable improvements in material properties, such as dramatically reducing the weight of the composite material while increasing the strength of the composite material. See the specification at page 4, lines 1-3 and page 13, lines 2-20, for example.

Matsko

Matsko pertains to a process of making low density syntactic foams. Matsko repeatedly refers to the material as a syntactic foam and describes how to make the foam material. The syntactic foam is made by combining a binder, a large amount of solvent and glass microspheres into a slurry. The slurry is quickly frozen to a solid. The solvent is sublimed, that is, evaporated from the frozen solid without passing through a liquid state. The binder can then be cured to form a syntactic foam.

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Applicant submits that sublimation of the frozen solvent, which is present in a significantly greater amount than the binder, will result in voids remaining in the binder. Matsko does not describe or suggest that the void spaces created by the solvent being sublimed be filled with binder. Rather, Matsko describes curing the binder to form syntactic foam. Table I of Matsko (columns 5 and 6) describes compositions having a very large amount of Benzene solvent relative to a small amount of resins: (A) Benzene solvent of about 220 cc and resins totaling 10 gms, (B) 250 cc Benzene and 4.5 gms resins, (C) 300 cc Benzene and 10 gms resins, (D) 300 cc Benzene and 25 gms resins, (E) 300 cc Benzene and 10 gms resins, and (F) 300 cc Benzene and 25 gms resins. When such large amounts of Benzene solvent is sublimed relative to such smaller amounts of resins, Applicant submits the post-sublimed solid will have voids.

Matsko describes the solid material being subjected to mold pressure after solvent sublimation. However, Matsko does not describe or suggest that the solid be compacted to remove the voids left by the substantial amount of sublimed solvent. There is insufficient amount of resin in the post-sublimed material to fill the voids created by the sublimed solvent.

Applicant further submits that it would not be obvious to modify Matsko to provide void free binder. Modifying Matsko to provide void free binder would be against the objective and description of Matsko to sublime a large amount of solvent from a frozen slurry, particularly to produce a syntactic foam. If it is asserted that the Matsko material can be modified to have void free binder, Applicant inquires how sublimation of the solvent can be modified to form such a void free binder without being contrary to the description of solvent sublimation to form syntactic foam?

Young

Young pertains to carvable epoxy resin compositions. Young describes a composition which is carvable and machinable with low wear on cutting tools. Young defines "machinability" of the composition as meaning "the ability of the material to be easily planed, shaped, turned or otherwise reduced to specified shape and dimensions with high accuracy by machines having cutting tools." See column 1, lines 30-33. Young also defines "carvability" of the composition as meaning "the ability of the material to be cut or carved in an artistic or decorative manner, including the ability of the material to be easily sculptured delicately." See column 1, lines 33-36. Young repeatedly asserts the composition has the desired properties of

machinability, carvability and low tool wear requirements of the composition. The Young composition does include hollow glass spheres. However, Applicant submits Young does not disclose or suggest Applicant's claimed sphere loading of about 69%-85% by volume. Indeed, the Office Action does not assert that Young discloses Applicant's claimed volume ranges of microspheres. Furthermore, Young teaches away from high glass sphere volumes in its composition. Young states that the hollow glass spheres are a hard material which ordinarily causes considerable tool wear. See column 5, lines 68-74. Young also states that compositions having hollow glass spheres without the wax-like, lubricous material have poor carving properties and cause considerable wear of cutting and carving tools. See column 7, lines 3-7. Accordingly, Young teaches away from high volumes of hollow glass spheres in its composition, because high volumes of hollow glass spheres would not provide machinable, carvable and low tool wear compositions. Thus, Applicant submits it would not be obvious to modify the Young composition to have Applicant's claimed high volume ranges of microspheres.

Filice et al.

Filice et al. pertains to an archery bow limb constructed of syntactic foam. The syntactic foam includes hollow microspheres and synthetic resin, among other components. Nowhere does Filice et al. mention the volume loading of the microspheres in the synthetic resin. The Office Action even acknowledges that Filice et al. is deficient in that regard. Applicant's independent claims 1, 15, 18 and 19 all define a lower end range of microsphere particles of about 69% by volume. Filice et al. simply does not disclose such a high lower end range volume of microspheres or any higher microsphere volume loading.

Furthermore, Filice et al. does not suggest Applicant's claimed high microsphere loading volume of about 69%-85%, nor is there a motivation to increase the microsphere volume loading in Filice et al. to the high volume of at least about 69%. Filice et al. is concerned about making an archery bow limb out of a syntactic foam that replaces hard wood, such as hard rock maple. An objective of Filice et al. is to provide a syntactic foam bow limb which is light weight yet possess adequate physical properties for an archery bow. See column 1, lines 59-61. Filice et al.

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purports to achieve that objective by including microspheres in the synthetic resin to reduce the density of the syntactic foam to below hard wood, such as hard rock maple. See column 2, lines 58-63. Those portions of Filice et al. merely describe reducing the density to below the density of hard wood (reduce the weight of the bow) while maintaining desired physical properties, apparently the desired physical properties are the physical properties of the hard wood bow the syntactic foam is replacing.

One of ordinary skill in the art armed with Filice et al. would be motivated to make an archery bow from synthetic resin by including microspheres to reduce the weight to below the weight of hard wood archery bows while retaining the desired physical properties of hard wood for an archery bow. However, one of ordinary skill in the art would not be motivated to excessively increase the volume of microsphere loading to the high levels claimed by Applicant, e.g. about 69%-85% by volume.

According to Filice et al., the physical properties of the syntactic foam are enhanced by including reinforcing fibers (such as glass or graphite fibers). See column 3, lines 30-34 and column 1, lines 45-50. The physical properties Filice et al. is seeking to enhance or emulate are the physical properties of hard wood desired for an archery bow. Because Filice et al. describes enhancing the hard wood-like physical properties by adding fibers rather than further increasing the microsphere volume loading, Filice et al. does not suggest Applicant's high microsphere volumes of about 69%-85%.

Applicant's composite material having high microsphere loading volumes remarkably provides high strength materials. Applicant's high volume density packing of the microspheres in the matrix material provides a network structure, and due to tangential pressures being exerted from one microsphere to the next along random paths in all directions, the composite materials exhibit remarkable strength. See the specification at page 4, lines 3-6. Contrary to the present invention, Filice et al. describes adding fibers to the syntactic foam to enhance physical properties to be similar to hard wood rather than including about 69%-85% microspheres by volume.

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The Office Action asserts that it would have been obvious to have engaged in routine experimentation to obtain the claimed percent by volume of microspheres. It may be routine experimentation to optimize the amount of hollow microspheres in the Filice et al. syntactic foam to make an archery bow limb. However, the routine experimentation would be directed to making a syntactic foam archery bow limb which is lighter weight than hard wood yet having desired physical properties of hard wood. The routine experimentation would not be directed to making any possible composition having resin and microspheres, and would certainly not be directed to Applicant's composite material having a high volume loading of microsphere particles.

"Reasonable to Assume"

The Office Action asserts in several instances that it would be reasonable to assume that there is substantially no void space between the microspheres in the prior art compositions. Applicant respectfully submits that reliance on a "reasonable to assume" assertion is an improper basis for a rejection. The "reasonable to assume" assertion appears to be an inherency argument. However, an inherent feature (limitation) is one in which the natural result flowing from the operation as taught would result in the performance of the questioned function. *See, Scaltech, Inc. v. Retec/Tetra, LLC.*, 51 USPQ2d 1055, 1059 (Fed. Cir. 1999). Inherency of the feature (limitation) in the prior art is not established merely by probabilities or possibilities. *See, Id.* The mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency. *See, Id.* Matsko, Young, and Filice et al. simply do not disclose or suggest Applicant's claimed matrix material being substantially free of voids between the microspheres. Applicant inquires why would the substantially void free matrix material be a natural result of the prior art compositions necessarily present in the prior art references and not merely possible or probable? The prior art rejections should be withdrawn for this reason alone.

Thus, Applicant submits that the §102 and §103 rejections should be withdrawn.

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New Claims

New dependent claims 65-68 have been added. Claims 65-68 pertain to some of the additional components which may be added to the composite material. Claims 65-68 are supported by the application as originally filed. See the specification at page 4, lines 4-6; page 9, lines 9-11; and page 13, lines 16-24, for example.

CONCLUSION

For the foregoing reasons, Applicant submits that the patent application is in condition for allowance and requests a Notice of Allowance be issued.

The Commissioner is authorized to charge and credit Deposit Account No. 02-1818 for any fees associated with the submission of this Response, including any time extension fees. Please reference docket number 112736-013.

Respectfully submitted,

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